

# *NAVY MEDICINE*

March-April 2001



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# NAVY MEDICINE

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**COVER:** One of the Navy's oldest operating hyperbaric chambers at Keyport Undersea Warfare Center, Keyport, WA, is currently being used for clinical hyperbaric oxygen therapy. Tender HT2(SW/DV) M. Sullins monitors a patient. Story on Page 1. Photo by John Brink.

# Medicine Under Pressure

LT RC Ruck, MC, USN  
LT SJ Escobar, MC, USN



Staff of NUWC Keyport, Washington Diving Locker.

The Navy maintains a small, multiplace hyperbaric chamber at scenic Keyport Naval Undersea Warfare Center located on the Kitsap peninsula of Washington State, as it does on several other Navy bases throughout the world. The primary mission of this chamber is to support military diving operations in the Pacific Northwest. Due to the presence of a large, active civilian chamber in Seattle, the Keyport chamber rarely treats civilian diving related accidents, unlike some of the Navy's other hyperbaric chambers. It is, therefore, able to offer its services for clinical hyperbaric oxygen

therapy (HBO) cases for active duty members, retirees, and dependents.

Hyperbaric oxygen therapy is defined as the intermittent administration of 100 percent oxygen at pressures greater than atmospheric. This may be accomplished in a multiplace chamber which is pressurized with air to the desired depth while the patient breathes 100 percent oxygen by face mask, face tent, or endotracheal tube. Alternatively, a monoplace chamber may be used which is pressurized with 100 percent oxygen. HBO therapy is primary treatment for arterial gas embolism and decompression sickness ("the bends").(1) It

has also been demonstrated to be a useful adjunct in therapy for several other disorders. Currently, there are 13 clinical conditions utilizing HBO therapy, which have been recognized and recommended for third-party reimbursement by the Undersea and Hyperbaric Medical Society. UHMS has developed a set of recommended clinical guidelines for the treatment of these conditions.

The chamber at Keyport is currently one of the Navy's oldest operating hyperbaric chambers, having been built at Norfolk Naval Shipyard in 1930. Over the past few years, the chamber has treated an average of six



to eight cases of diving related decompression illness per year, ranging from type I decompression sickness (DCS) to arterial gas embolism (AGE), and a similar number of altitude chamber induced DCS from nearby Oak Harbor Naval Air Station. It also performs 150-200 HBO treatments per year, ranging from osteoradionecrosis to chronic osteomyelitis to necrotizing fascitis. It does this on a shoestring budget, at a fraction of the cost the Navy would incur if it were to send these patients for treatment at a civilian institution. The average cost at the local civilian hyperbaric facility for HBO is \$253 per hour or \$506 per treatment. The expense at the Keyport chamber is an average of \$23 per treatment, plus yearly maintenance costs.

Potential cases are referred from nearby Naval Hospital Bremerton and Madigan Army Medical Center. The undersea medical officers (UMO) stationed at Submarine Group Nine and Branch Medical Clinic Bangor serve as the consulting physicians. After the patients are examined and the records reviewed, the UMOs will contact one of several hyperbaric specialists to review the treatment plan. If there is agreement as to the appropriateness of the treatment protocol, the Bureau of Medicine and Surgery (MED-21) is contacted for approval to treat the patient with HBO therapy. Most conditions require this official approval before treatment can be begun, even though HBO can be initiated emergently on the first five clinical conditions listed in Table 1.

Cases of DCS and AGE are treated with the appropriate Navy treatment table. Clinical HBO is usually conducted in a multiplace chamber at 45 feet of seawater for 90-120 minutes, which has recently been incorporated into the Navy Diving Manual Revi-



**Multiplace Chamber built at Norfolk Shipyard in 1930. Pictured are outside tender BMCS (SW/DV) T. Wood, diving supervisor MMC (SW/DV) P. Newman, and communications and logs diver YN1 (SW/DV) M. Sonnenberg.**

sion 4 referred to as Treatment Table 9. Treatments have been conducted emergently at all hours and may require up to three treatments a day.

Hyperbaric oxygen therapy has been used for medical therapy since the 1950s. Prior to the 20th century, the elite of Europe used large chambers pressurized with air. They believed the chambers, which were referred to as "pneumatic spas," were good for all ailments. In 1870 a French surgeon conducted 20 surgical procedures in a mobile chamber using nitrous oxide as an anesthetic. The use of compressed air chambers claimed to be useful treatments for many diseases but there was little scientific basis for their claims. In the emerging science of medicine, compressed air therapy was seen primarily as "voodoo." In the 1950s oxygen was incorporated into the hyperbaric environment. It proved useful as a radiomimetic for cancer patients, and cardiac surgery was performed using HBO in order to delay hypoxic

episodes. In the early 1960s published studies on the treatment of gas gangrene and carbon monoxide poisoning demonstrated the efficacy of HBO. Although positive results were noted, there was still little scientific basis for HBO therapy. "Quacks" were still making claims for treatment of all ailments. In response to the need for treatment guidelines, the Undersea Medicine Society was founded in 1976, and in 1977 treatable hyperbaric disorders were listed and sent to the Health Care Finances Administration and National Blue Cross/Blue Shield for third party reimbursement.

HBO's mechanisms of action are primarily related to hyperoxygenation of tissues. At 3.0 atmospheres absolute (the pressure equivalent of 66 feet of seawater) an arterial PO<sub>2</sub> of up to 2200 mm Hg is achieved. This correlates to 6.9 volume percent dissolved oxygen in the plasma, which is a quantity sufficient to maintain life in the absence of hemoglobin.(2) In this

hyperoxygenated environment, diffusion of oxygen occurs up to 280 microns away from the capillary wall, which under normobaric conditions occurs out to only 30 microns.

In the presence of low tissue oxygen tensions, as occurs with certain disease processes, white blood cells demonstrate a decreased ability to kill organisms. One hundred percent oxygen at pressures greater than 1.5 ATA has been shown to adversely affect bacterial growth of several aerobic and facultative anaerobic bacteria by inhibiting several microbial metabolic reactions, including the synthesis of proteins, nucleic acids, and essential cofactors, and the disruption of membrane transport functions.(3)

HBO also increases the generation of oxygen free radicals, which are toxic to anaerobes, as they lack antioxidant defenses. These radicals damage cell membranes, cellular proteins and DNA. Additionally, HBO enhances the bacteriocidal actions of neutrophils. Like other eukaryotic cells, neutrophils depend on glycolytic processes to survive in severely hypoxic environments. Hyperbaric oxygen therapy increases the oxygen tension, and promotes oxidant mediated killing.(4,5,6) HBO has also been demonstrated to increase the efficacy of certain antibiotics allowing for control of infection.(7)

HBO therapy decreases edema and prevents further tissue damage from white blood cell adherence after per-

fusion is restored to body tissues that have undergone a compromise in blood flow, as is the case in crush injuries and amputations.(8,9)

Enhancement of wound healing is another benefit of HBO therapy. This is accomplished through increased fibroblast replication, increased collagen formation, and capillary growth. (10,11,12) Other physiologic benefits are increased deformability of red blood cells and increased osteoclast activity.

Navy divers assigned to the regional dive locker at Keyport operate the chamber. A chamber team consists of a chamber supervisor, an outside tender, a diver to man the communication and logs station, and an inside tender, who monitors the pa-

	Approved Indication	Recommended Number of Treatments and Recommended Pressures (ATA)
1	Air or Gas Embolism	1-14 Treatments using U.S. Navy Tables
2	Severe Carbon Monoxide Poisoning, Smoke inhalation	1-10 Treatments at 2.4 ATA
3	Gas Gangrene	5-10 Treatments at 3.0 ATA
4	Decompression Sickness	1-14 Treatments using U.S. Navy Tables
5	Necrotizing Soft Tissue Infections	5-30 Treatments at 2.4 ATA
6	Crush Injury or Compartment Syndrome	3-12 Treatments at 2.4 ATA
7	Exceptional Blood Loss	1+ Treatments at 2.4 ATA
8	Problem Wounds (Diabetic Foot Ulcers, Decubitus Ulcer, etc.)	10-60 Treatments at 2.4 ATA
9	Intracranial Abscess	12-15 Treatments at 2.4 ATA
10	Refractory Osteomyelitis	20-60 Treatments at 2.4 ATA
11	Delayed Radiation Injury (Osteoradionecrosis and Soft Tissue Radionecrosis)	20-60 Treatments at 2.4 ATA
12	Compromised Skin Grafts and Flaps	6-40 Treatments at 2.4 ATA
13	Thermal Burns	5-45 Treatments at 2.0 ATA

**Table 1: Approved Uses and Threshold Levels for the Number of Hyperbaric Treatments ( 1).**

tient throughout the treatment. These divers have been trained in the medical aspects of pressure related disorders and are knowledgeable in the signs, symptoms, and mechanisms of carbon dioxide, nitrogen, and oxygen toxicity.

Although clinical HBO treatments are not their primary duties, these divers have repeatedly stated that they enjoy the opportunity to participate in the medical treatment of patients. They have come in at all hours of the night to help a fellow diver, dependent, or retiree in need of an emergent HBO treatment. These treatments also give them an opportunity to remain proficient in chamber operations.

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**100% oxygen being administered through an oxygen hood. Pictured are (inside tender) HTC(DV) D. Bradbury and mock patient EN1(SW/DV) B. Marler.**

# Oral Health is Within REACH

CAPT Larry N. Williams, DC, USN  
CDR John McGinley, USN

**T**he most recent Surgeon General's report, which highlights the poor Oral Health in America, is easily understood if one were to visit the recruit dental in-processing facility at Great Lakes Naval Training Center. Current findings indicate that the oral health of incoming Navy recruits is the poorest it has been since the Vietnam War era. Given that only 60 percent of Americans have dental insurance, it is no surprise many of the individuals entering the Navy as recruits have had little information or routine dental treatment provided to improve their oral health.

Having recognized the decreased state of oral health among recruits several months prior to the release of the report, the Oral Health team at Great Lakes Naval Dental Center, led by CDR John McGinley, DC, and

CAPT Larry Williams, DC, instituted a comprehensive program to improve the Oral Health of the Navy's newest Sailors. This program, called **Recruit Education to AChieve Health (REACH)**, provides the Great Lakes Naval Training Center military members and their families with information and treatment designed to improve their oral health. To better understand this program, let's first take a brief look at the Great Lakes Naval Training Center (NTC) complex.

## **Navy Training Background**

The Great Lakes Naval Training Center is home to the Navy's only Recruit Training Command. The largest military installation in Illinois and the largest Training Center in the Navy, the base includes 1,153 buildings on 1,628 acres and uses 50 miles of roadway to provide access to the Center's

facilities. Since its founding in 1911, the Training Center has prepared men and women for duty in Naval Service.

In 1994, Recruit Training Center (RTC), Great Lakes became the Navy's only Recruit Training Command. All recruits entering RTC are tobacco-free from their first day at RTC. From the first day at RTC through graduation day, over 50,000 recruits per year find themselves in a whirlwind of activity: forms to be filled out, medical and dental exams, inoculations for protection from a variety of diseases, haircuts, swim survival tests. And that is just the first few days.

When the young men and women arrive, they are formed into divisions and assigned a Recruit Division Commander (RDC). For the next 8 weeks, the "RDC" will be the person most directly responsible for molding the



recruits into Navy men and women. RDC's are chief petty officers or senior petty officers specially selected because of their leadership and teaching abilities. They must represent and teach Navy tradition, customs, and discipline.

The first 3 weeks of recruit training are the toughest. The workload is heavy and the recruits must adjust to a completely new way of life. Classroom instruction, military drill, physical fitness training, and instruction by the Recruit Division Commander leave the recruit little free time. During the third week, divisions enter into the competitive aspect of training. Excellence in academic achievement, military drill, cleanliness, and athletics all count toward earning honor flags. The competition encourages teamwork and develops pride in achievement.

In addition to normal classroom instruction periods, the recruits may spend hours in the "field" learning fundamentals of ordnance and gunnery, seamanship, swimming, water survival, and fire-fighting. Three drill halls provide space for practice in competitive military drill and physical fitness training.

Recruits live in 1000-bed barracks and eat at the recruit galleys. Staff members live in staff barracks, base housing, and in surrounding communities. Each week the commanding officer of Recruit Training Command hosts an impressive recruit graduation review ceremony that attracts more than 100,000 visitors annually.

After graduation from RTC, approximately 60 percent of the Navy's newest Sailors will find their way to the Service School Command (SSC) also located at Great Lakes Naval Training Center. SSC provides instruction to Sailors in numerous technical fields. Altogether, over 100

separate courses are taught at SSC. Each school at SSC is officially accredited through the North Central Association of Colleges and Schools as a quality assurance measure and to ensure the curriculum meets or exceeds national standards. The Commission of the Council on Occupational Education (COE) awarded SSC with the accreditation certificate of higher education October 1998.

SSC has an annual throughput of approximately 43,000 students, with up to 8,000 students onboard at any time. To ensure the command continues to send quality Sailors to the fleet, training is balanced between the technical aspects of the rating, along with reinforcing and continuing the military training initiated at Recruit Training Command.

SSC has become the Navy's largest technical training facility. Every student is provided with a solid base of training, both military and technical, before departing Great Lakes to continue his or her career in the fleet.

### **Navy Dental Standards**

In order to better understand the need and impact for the REACH Program, let's first briefly discuss the Navy's dental standards. Currently, Sailors entering Navy service should be in a state of 95 percent "dental readiness." In other words, these Sailors should **not** have a dental condition that could conceivably cause a dental emergency within 12 months. This 95 percent state of readiness is necessary because the majority of Sailors are stationed on ships without dental facilities. Unfortunately, due to training requirements during RTC and SSC, dental staffing shortages, and operational military commitments in the Fleet, this 95 percent readiness figure incorporates approximately 80 percent of the Navy's Sailors that

have some form of diagnosed minor oral disease that is left untreated.

As stated earlier, the current oral health status of incoming Navy recruits is the poorest it has been since the Vietnam era. The most recent statistics show that 70 percent of this year's over 50,000 incoming recruits have **severe** oral disease that, without immediate treatment, would make them ineligible for duty in the Navy. Along with this severe oral disease comes a lack of oral health instruction that would allow any treated oral disease to repeat itself. Thus, to ensure the success of provided dental treatment, the REACH Program was developed to augment the treatment of the Sailors at Great Lakes Naval Training Center.

### **REACH Background**

The beginnings of the REACH program are established in the Navy's Manual of Medicine Chapter 6, which pertains to the delivery of dental care. Current guidelines state that all active duty Navy personnel must have an annual dental examination which must include a blood pressure screening, tobacco use intervention if a tobacco user, oral health counseling, oral cancer screening, periodontal screening and recording (PSR), and necessary referrals for care. In order to further improve the oral health of the military members at Great Lakes, the REACH program has enhanced and added to these guidelines.

REACH is made up of four phases and is being delivered to the NTC, RTC, and the SSC plus all support activities. Phase 1 is geared to over 50,000 recruits who are processed through RTC each year. This multimedia program consists of dental health awareness, nutritional and dietary information, tobacco awareness and intervention, tobacco use relapse



prevention education, and other general and oral health topics.

When first reporting to recruit in-processing, the dental team provides recruits with an explanation of the type of oral health care they will be provided. They are also informed when they will receive this care during their training. They are given an explanation of the decay process and told how to avoid future decay, informed on the importance of good nutrition for general and oral health, instructed on the importance of purchasing ADA approved products and the proper use of these products. Additionally, they are given medical, aesthetic, and monetary reasons for not resuming or starting to use tobacco products following recruit training. All recruits reporting to dental for treatment are provided continuous closed circuit programs dealing with numerous oral and general health promotion topics. Additionally, these recruits have access to health promotion literature while waiting for their dental appointments. During the last week prior to graduation, all recruits receive an evening lecture presented by dental officers assigned to the Great Lakes Naval Dental Center. These dental officers stress the importance of non-tobacco use after RTC since they have been tobacco-free for over 8 weeks. The lecture also informs the recruits about the Family Member Dental Plan, the importance of improving and maintaining their oral health after boot camp, where to get help to quit tobacco if they resume or initiate tobacco use, and some brief information on sexual health. Initial studies indicate that this presentation has decreased the return to tobacco use after RTC by 50 percent.

Phase 2 of the REACH Program is geared to the recently graduated recruits who are attending SSC pro-

grams at Great Lakes (approximately 60 percent of the graduating recruits from RTC). These new Sailors are no longer mandated to be tobacco-free. Thus this phase of the REACH program reinforces the material presented during their recruit training plus offers tobacco cessation help using one-on-one primary care tobacco cessation intervention. Maximum use is made of the teachable moment available during dental visits as well as other times that do not interfere with military education at SSC.

As part of base-wide indoctrinations for newly arrived staff members and their families, Phases 3 (active duty staff) and 4 (eligible beneficiaries) of the REACH Program provide information to improve oral health in these populations. The success of the REACH Program is aided by these dental indoctrination lectures given to newly reporting division commanders and SSC instructors responsible for training naval recruits and SSC students. These personnel are instructed on the dental mission, the REACH program, and how vital it is to the readiness of the Navy's newest Sailors. They are educated on military dentistry classifications and terminology, the prioritization of dental care during recruit and student training, and the need for maintaining and/or improving the oral health of the recruits and students. Additionally, they are provided information to improve their own oral health, which also includes tobacco cessation intervention.

Naval Dental Center is very active in health promotion at Naval Training Center (NTC) Great Lakes. The "Recruit Education to Achieve Health (REACH)" program is reaching every recruit, student and staff member assigned to Great Lakes. "The goals of this program," under the direction

of CDR John McGinley, "are to educate recruits, students and staff about their oral health, encourage them not to return or initiate tobacco use, discuss active duty and their family member dental benefits, nutritional counseling, and a brief sexual health message."

Another highly visible objective of NDC's REACH Program is placing table displays and posters in key areas around the base. These health-related displays contain helpful health messages, models, and other high impact posters geared to educate and improve oral and systemic health. The galley lines and clinical waiting areas are going to be used to provide health education messages as recruit, student, staff, and families are waiting to be served or treated.

Thus, as evidenced by the current poor oral health of incoming Navy recruits, the oral health of America is in dire need of help and the REACH Program being delivered by the Naval Dental Center at Great Lakes Naval Training Center is indeed a good start in improving the oral health of the Navy's newest Sailors. Once the program is in place in other federal services, a segment of the United States will have better oral health within their REACH. □

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# Navy Medicine in the Forgotten War Korea 1950-1953 PART III

CAPT Eugene H. Ginchereau, MC, USNR



BUMED Archives

USS *Consolation* (AH-15) was the first Navy hospital ship to be equipped with a helo deck, taking aboard its first helicopter-borne casualty on 18 December 1951.



**A wounded Marine rides a "trolley" to an aid station close to the main line of resistance. Korea's rough terrain required such innovative solutions.**

**T**he evacuation of United Nations forces fighting in northeast Korea against the newly arrived Chinese Communist Army in December 1950 was the largest naval operation of the Korean War. During the period 11 December to 24 December, 105,000 U.S. and Korean military personnel and their equipment, and 91,000 refugees were evacuated from Hungnam.<sup>(1)</sup> The first division to embark was the First Marine Division which had just completed its historic withdrawal from the Chosin Reservoir in a 13-day running battle against overwhelming numbers of Chinese Communist troops.

The Division was reassigned from X Corps to the U.S. Eighth Army and placed in a reserve status near Masan in South Korea, a place known as the "Bean Patch," the original bivouac area for the First Provisional Marine Brigade in August 1950. For the remainder of 1950 and the beginning of 1951, the Division along with the officers and corpsmen of the First Medical Battalion re-organized, re-equipped, and trained. On 24 January 1951, CDR Howard A. Johnson, MC, became the First Marine Division Surgeon, relieving CAPT Eugene R. Hering, MC. During the 6 months he served in Korea as the senior Navy combat medical officer, CAPT Hering was the driving force behind the outstanding performance of Navy medical personnel at Pusan, Inchon, and the Chosin Reservoir. Few Navy medical officers served in Korea with more dedication and professionalism than CAPT Hering. He departed Korea "with the gratitude of all Marines for his care of casualties," especially for his performance in the Chosin Reservoir Campaign.<sup>(2)</sup>

### **Advance to the Punchbowl**

In response to the continued Chinese Communist offensive, the First Marine Division was re-deployed in a series of operations with the U.S. Eighth Army IX and X Corps in early 1951. Operations "Killer" and "Ripper" were designed to stabilize and advance the front near the 38th Parallel. On 11 April 1951 President Truman relieved GEN Douglas MacArthur as Commander-in-Chief, United Nations Forces and replaced him with GEN Matthew B. Ridgway. This change in command resulted in an increase in operational tempo. From April to June 1951, the Marines fought continuously, for hill after hill, in the mountainous terrain of east-central Korea.

One series of ridges surrounding a circular valley created by a dead volcanic crater, the "Punchbowl," became the scene of many desperate encounters with the Chinese by X Corps and the Marines. The Army would remember these battle sites as "Bloody Ridge" and "Heartbreak Ridge;" the Marines would remember them as numbered hills, sites of small unit actions with some of the highest casualty rates the Marines experienced in Korea. The First Marine Regiment experienced over 1100 casualties in June 1951 alone, a higher total than the Regiment reported during the entire Chosin Reservoir operation.<sup>(3)</sup>

### **Innovations in Casualty Evacuation and Prevention**

The difficult terrain and the large number of casualties necessitated new ways of moving wounded Marines from remote areas, inaccessible to the usual evacuation





Mobile Dental Unit #1, 1st Marine Division 1951.

vehicles. Korean civilian laborers were used extensively as “cargadores” and litter-bearers. The most important change, however, introduced for the rapid transport of the wounded was the helicopter. The helicopter was used early in the war primarily to rescue downed pilots or to observe enemy troops dispositions, but the Marines and Navy medical personnel quickly realized the usefulness of it as an evacuation vehicle. By 1951 the helicopter had become the predominant means of casualty evacuation for the Marines. In the 3-month Marine offensive in east-central Korea, 1 April to 30 June 1951, 701 “mercy flights” were flown, most in the new Bell HTL-4 helicopter, the first to be designed specifically for air evacuation with built-in litters and plexiglas hoods.(4)

The advent of helicopter evacuation led to another important innovation that further reduced the time delay for the definitive treatment of combat wounds. During the summer of 1951 the USS *Consolation* (AH-15) became the first hospital ship to be fitted with a helicopter landing platform. On 18 December 1951, while steaming close to shore 15 miles north of the 38th Parallel, the *Consolation* received the first casualty ever flown directly from a battlefield to the landing platform of a hospital

ship.(5) “Operation Helicopter” would be repeated countless times throughout the war by the ship many dubbed the “Galloping Ghost of the Korean Coast.”

Navy medicine was also responsible for a significant development in the prevention of combat wounds. Researchers had long known that 50 percent of fatal wounds involved the chest and that 60 percent of these were caused by shell, mortar, and grenade fragments. Nevertheless, since World War I they had little success in developing a body armor which was protective, yet light and flexible enough to allow for maneuverability. The breakthrough came in the spring of 1951 when LCDR Frederick J. Lewis, MSC and his associates at the Naval Medical Field Research Laboratory designed an armored vest, weighing only 8½ pounds, that could stop all fragments of a hand grenade at 3 feet and 75 percent of an 81mm mortar at 10 feet.(6) The vest (Vest, Armored, M1951) was made of curving, overlapping doron plates, layers of laminated fiberglass cloth, to cover the lower chest, and a flexible pad of basket weave nylon to cover the upper chest.(7)

In the summer of 1951 the vests were field tested by the 5th Marine Regiment of the First Marine Division



and the 23rd and 38th Regiments of the Second Infantry Division in the Punchbowl and Inje areas of the X Corps front. These tests were so successful that, after modifications, the vest was placed into general production. By the spring of 1952 most Marines were wearing the M-1951 armored vest in combat.(8)

### Old and New Diseases

Korea presented Navy medicine challenging obstacles to the protection of the health of Marine Corps and Navy personnel. Largely unprepared men and women fought in extremes of hot and cold weather, exposed to water and food-borne endemic gastrointestinal diseases, smallpox, tuberculosis, malaria, and the ever present venereal diseases. For the first year of the war, Navy medical and dental disease prevention specialists struggled to provide the basic disease control measures, sanitation, and heat and cold injury protection. As the war turned from one of maneuver to one of position and eventually stalemate in late 1951, environmental protection dramatically improved, resulting in lower disease incidences and hospi-

tal admission rates.

Malaria peaked in incidence among Marines in September 1951 to a rate of 17.5 cases/1000. This rate decreased considerably with the introduction of a new drug, primaquine, and the change in strategy of warfare which allowed troops the time and availability to use anti-malarial measures.(9)

Dysentery and diarrheal diseases were a constant problem in Korea. Marines on the move in hostile territory used whatever water they could find. Often they used rice-paddy water or water from polluted streams and lakes. The highest incidence of these diseases occurred in August 1950. Although the access to disease-free, potable water greatly decreased the rates of disease, the problem was never completely eradicated and outbreaks continued to occur as late as August 1952.(10)

Besides the common diseases of warfare, Navy medicine had to cope as well with rarer, more exotic diseases such as Epidemic Hemorrhagic Fever and Japanese B Encephalitis. The first case of Epidemic Hemorrhagic



Enclosed pods protected patients from the elements.



HO3S helicopter evacuates wounded from the front in east central Korea to hospital ship *Consolation* (AH-15).

Fever, a disease unknown to Western medicine at the time, was reported by the Far East Command in June 1951. Once this highly fatal disease was characterized and more easily recognizable, the reported number of cases more than doubled among Navy and Marine Corps men and women, rising from 30 cases in 1951 to 55 cases in 1952. The infection was particularly dangerous since there was no known cure and the fatality rate approached 10 percent. Hemodialysis helped lower the fatality rate to 5 percent, but this disease remained the leading cause of disease related death in Korea during 1951-1952.(11,12)

Japanese B Encephalitis was known to be an endemic disease in Korea prior to the war since it had been reported among U.S. Army occupation troops as early as 1946. The first case reported during the war was on 16 August 1950. Although the disease had a high fatality rate of 9 deaths/100 cases admitted and remained a persistent threat, it was not reported frequently among the

Navy and Marine Corps force.(13)

### Front Line Dentistry

Navy dental officers and technicians worked side by side with their medical counterparts throughout the Korean War. Wherever the Marines went, dental personnel were there, more often than not assisting with casualty care and treatment. Dentalman Thomas A. Christensen, Jr., USN, is representative of the sacrifices that these men and women of Navy dentistry made in Korea.(14) He received the Navy Cross posthumously for valor demonstrated on 6 November 1950 while treating casualties.

Prior to the Korean War the provision of front line definitive dental care was considered impractical, but the arrival of World War I style warfare in 1951, stimulated a new approach to this old problem. Major dental facilities were moved closer to the front, and 2½ ton 6 x 6 trucks were outfitted as Mobile Dental and Dental Laboratory Units. Janeway Huts replaced tents, allowing for

rapid relocation and setup of regimental dental sections. As a result of these actions, during the period 1 July 1951 to 29 February 1952, 63,857 dental patients received definitive dental care and preventive treatment often within 2000 yards of the battle line.(15)

### The Search for Peace

By the end of June 1951 United Nations forces had repulsed the great Chinese Communist offensive begun in December 1950. On 25 June 1951 the Chinese Communists called for truce talks, which subsequently began in early July at Kaesong. The U.S. Eighth Army then went into defensive posture, allowing the First Marine Division to move into a reserve status at Inje.

On 22 August the truce talks ceased when the Chinese accused United Nations forces of violating the neutrality of the Kaesong area. One week later the Marines re-deployed to the Punchbowl. Approximately 1 month later, 20 September, all offensive operations by United Nations forces ceased on a front which roughly followed the 38th Parallel, stretching across the waist of the Korean Peninsula north of Seoul in the west to north of Kosong in the east. Despite the lull in the fighting, the Marines experienced 1,822 casualties during September 1951, the third highest monthly total since the war began.(16)

Peace talks resumed on 25 October at Panmunjom, and a cease fire was declared in late November, which lasted throughout the remainder of the year. Regardless of the agreement, both sides continued to experience casualties in limited tactical engagements, patrols, and guerrilla actions.

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# Why Send Them When You Can Keep Them?

LCDR Richard Maffeo, NC, USN

In an era of rapidly dwindling TAD/TDY funds, here's a way to provide your nursing staff the opportunity to acquire mission-essential training, as well as CEUs, at a fraction of the cost to send them outside your facility.

More than 270 nurses representing the tri-services, Naval Reserve, government service, and local community hospitals attended a 3-day nursing symposium hosted by the Naval Medical Center, San Diego. "Bringing Nurses into the New Millennium," attracted experts from a variety of nursing specialties, each highlighting clinical, operational, or career issues in nursing. The symposium provided local availability of up to 15 continuing education units for each attendee, a cost-avoidance of many thousands of dollars in TAD funds. Furthermore, after receipt of registration fees and final accounting of expenses, the Nursing Directorate realized nearly \$1,200 in surplus funds.

The course director gathered a committee of mid-level nurses, representing a cross-section of nursing specialties: surgical, medical, critical care, telehealth, informatics, research, infection control, and ambulatory clinics. Recruiting a dozen members permitted the committee to move forward with decisions when as few as seven (our quorum) attended any given meeting. We also added ad hoc members as needed (e.g., for database cre-

ation, online registration, and graphic design). Committee members broke off into subcommittees tasked with such things as marketing/advertising the symposium, providing food, printing, audio-visual support, housing and travel for our outside speakers.

The choice of multiple-specialty representation was deliberate and designed to prevent potential "group think" mentality among members belonging to the same area of expertise. Gathering nurses from a broad spectrum of nursing experience also facilitated a well-rounded choice of topics for presentation at the conference. We did not want to compete with the established focus of the biennial Shea-Arentzen Nursing Symposium, but rather provide our target audience (junior nurses) an opportunity to attend lectures along three tracks—clinical, operational, and career.

Although Naval Medical Center San Diego enjoys a vast amount of nursing expertise among the staff, and we could have easily matched subject matter with those experts, we offered a few facilities beyond our walls an opportunity to participate as lecturers. Because the Navy frequently rotates its nurses every 2 to 3 years, even small commands have a lot of talent floating in and around their divisions and departments. We wanted to tap that talent.

We realized rental of a facility large enough to accommodate the number of expected attendees would be the



most costly part of our budget. We were also keenly aware that we did not have a big budget. During our first few meetings, we were not sure if we had any. Therefore, the committee investigated using one of the two larger facilities on campus--our education department and the Naval School of Health Sciences. Both could provide several rooms for break-out sessions and an auditorium equipped with state-of-the-art audiovisual capability. We set a symposium date 6 months in the future, expecting our plans would require at least that length of time to pull everything off. In retrospect, we should have given ourselves another month. We settled on the School of Health Sciences because their calendar was open during the period the committee had set to hold the symposium.

We charged a small registration fee (\$10 per day or \$25 for all 3 days) to offset our costs for speakers' honoraria, per diem, and travel. Fees also offset costs of printing and other incidentals. Food costs proved to be a major funding problem. Because government regulations prohibit fees assessed for registration to be used for food we found ourselves scouring the hospital's fiscal department looking for alternative funds. They graciously provided Gift Fund monies, but encouraged us to next time set up a commercial checking account in the name of the symposium. It is unlikely that TAD funding will increase any time soon. But that does not have to be an obstacle to providing your staff with high-quality instruction. Whatever size your facility, you have the expertise resident within your walls, or close by, to offer a 1-day or a multiple-day educational feast for your staff. For about the cost of a dinner date, they can acquire updated training and earn required CEUs for licensure, and also enjoy the opportunity to network with colleagues from across the nation and around the globe.

### **Titles of lectures presented**

Wound Care, Cultural Diversity, Complimentary Therapies, Diabetes Management, the Changing Face of Navy Nursing, ARDS, Computer-based education, Nurse Entrepreneur, Managed Care in the 21st Century, Advanced Practice Roles (Panel), Telehealth, Research, Pediatric Case Management, Pain Management, MSN Preparation, Changes in Ambulatory Surgical Nursing, Organ Transplant, Adult Case Management, Legislative Impacts on Nursing, Emerging Roles in the Operational Setting, Burn Treatment, and Bioterrorism.

### **Lessons learned**

We should have provided maps for attendees to direct them to the symposium and to parking.

We should have secured funding earlier in our planning stages to prevent committee members from digging into their pockets for up-front money.

We assigned personnel to each room to ensure the audiovisual equipment was ready for the next speaker. Room monitors were also responsible to introduce the speakers and keep them informed of the time left to their lectures. We should have incorporated the room monitors into our training discussions earlier than we did (the last few days before the symposium).

We should have assigned working parties well in advance of opening day for set-up and tear-down. We assigned them as almost an after-thought and found ourselves in a very stressful scramble for bodies only hours before the symposium was to begin. □

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Recently, we have been receiving many articles and photographs electronically. While electronic submission is certainly acceptable for the text portion, unfortunately we, do not have the equipment necessary to translate digital photography to an acceptable print for publication. Therefore, in the future, hardcopy photographs must accompany any articles submitted for consideration, along with complete captions and photo credit information. All articles submitted must be no longer than eight pages double-spaced. These eight pages must include references and/or bibliographies. Any tables and/or charts must be submitted as separate files and must be in black and white.

# Philadelphia, Nurses, and the Spanish Influenza Pandemic of 1918

James F. Armstrong, RN, BSN, CCRN



In December 1918 the appropriate uniform for Seattle Police Department included mandatory masks.

*I had a little bird and its name was Enza  
I opened the window and  
in-flu-enza*

*Children's jump rope rhyme heard nationwide during the height of the pandemic.*

**T**he Spanish Influenza of 1918 was the greatest, most lethal pandemic the world has ever known. In its 10-month duration between 22 and 40 million people perished worldwide. Estimates place the death toll in the United States at over 675,000 with over 22 million becoming ill. Leading physicians of the time thought the illness a bacterium, but in fact it was something not yet discovered—a virus. Americans were familiar with the flu; it sent you to bed, made you miserable for 3 or 4 days with fever, muscle aches, and congestion, then left you shaky for about a week. It made millions sick, yet killed only the oldest, youngest, and most feeble.

The 1918 influenza was not the flu Americans were familiar with. It was a horror that turned victims bluish-black then drowned them with their own body fluids. The death toll was highest in the ages 15 to 40, those in the peak of health. The victims would be fine one minute and the next incapacitated, fever-racked, and delirious. Temperatures rose to 104-106 degrees, skin turned blue, purple, or deep brown from lack of oxygen. Massive pneumonia attacked the lungs, filling them with fluid; blood gushed from the nose. Death was quick, savage, and terrifying.

The America of 1918 was in its second year of involvement in World War I, and millions of young Ameri-

cans were in uniform. Great military camps were established throughout the United States for the training of soldiers and filled to overflowing. Most of these camps were near large cities or well populated areas. Railroads moved these soldiers rapidly across the country toward the East Coast to pack into troopships bound for the battlefields of Europe. Sailors and merchant seamen who crowded port cities had access to all parts of the world.

Civilians flooded cities to work in the expanded war industry, huge rallies and parades were held, all to support the war effort. The country was the perfect breeding ground for the coming pandemic.

The pandemic had three distinct waves, the first coming from the American heartland, most probably Kansas. During March soldiers and civilians around Ft. Riley, KS, rapidly became ill; some of them died, their lungs swollen with bloody fluid. The disease spread to other camps and port cities. Statistics of military and civilian deaths in March and April of 1918 demonstrated a sharp rise between the ages 21 to 29. The illness astounded physicians with its rapid onset, how rapidly it spread, and how quickly it killed those in the most robust of health.

Then, that summer, it subsided, and the United States was virtually free of the flu. However, the disease was

on the move, riding the troopships to Europe and turning them into a nightmare of illness and death.

The influenza then arrived in Europe with the 1.5 million soldiers who brought more death with their virus than the weapons they carried. It raged across Europe and into Asia, eventually killing more American soldiers than the war. Approximately 80 percent of Spain's population contracted the flu giving rise to the rumor it started there.

Sometime, late in the summer of 1918, the virus mutated in a response to increasing human antibodies. Now in its most virulent form it returned in the same ships that took it to Europe, making landfall in Boston in September. There, it killed over 2000 people.

### **Philadelphia**

Philadelphia's population in 1918 was 1,700,000 with war industry adding another 300,000 transient workers. The city was teeming with large ghettos representing every oppressed ethnic group from Europe. The city's medical resources, some of the best in the country, were strained. Twenty-six percent of Philadelphia physicians and a much larger percentage of nurses were away serving with the military; 75 percent of Philadelphia's hospitals' medical and surgical staffs were overseas. Although the city's board of health knew the flu had got-

ten to Europe in July, and had made it to Boston by the third week of September, it still did not make it a reportable disease. The flu was coming to Philadelphia and the city was not prepared

The disease appeared first at the sprawling naval base and shipyard on 18 September. The next day 600 sailors were ill; at the same time civilian hospitals started receiving patients. The board of health now began to act by instituting a public campaign against coughing, sneezing, and spitting. Philadelphia was about to become the American city with the highest, most rapidly accumulating, death toll in the worst pandemic in recorded history. In a single day, the death toll reached 1,700.

Dr. Paul A. Lewis, director of the Phipps Institute of Philadelphia stated he had isolated the cause of the flu, Pfeiffer's Bacillus. *The Philadelphia Inquirer* reported that this discovery armed the medical profession with the absolute knowledge on which to base its attack on the disease. They both were wrong! Despite the crisis, on 28 September, 200,000 people gathered in the streets to view the kickoff of the Fourth Liberty Loan Drive. The parade stretched 23 blocks through the city; death marched with it.

By 4 October the University of Pennsylvania's newspaper *The Daily Pennsylvanian* reported 636 new cases and 139 deaths. The paper would continue to give a daily count throughout the epidemic. On that day the board of health closed all schools, churches, theaters, and saloons. All citizens were ordered to wear gauze masks in public, "Obey the laws and wear the gauze protect your jaws from septic paws." Those daring not to wear masks were ridiculed by being called "slackers," the worst epithet of the day, or were physically run off the

streets. A sneeze or cough sent people scurrying.

As the death toll mounted, a frantic public stripped medicines from pharmacy shelves. Students from Philadelphia College of Pharmacy and Temple University assisted in filling prescriptions, mostly for whiskey, as it was the only place one could get it. As medications disappeared, people turned to folk remedies and ridiculous concoctions sold by charlatans.



American Red Cross

In Seattle it was unlawful to board a streetcar without a mask.

On 10 October, 528 died in the city. Thirty-fourth street, in front of Philadelphia General Hospital, was crowded with vehicles of every description bringing the sick, the dying, and, in most cases, the dead to the hospital. The scene was repeating itself in front of every hospital in the city. Many of the staff of PGH were sick. Because this was a disease of necessity (meaning care was provided for the symptoms, not the cure), the majority of work fell to nurses. PGH



School of Nursing's chief nurse, Lillian Clayton, worked 48-hour shifts. Sheer exhaustion allowed many of the nurses to become ill; four died. Miss Clayton offered to allow all preliminary (freshman) nursing students to return home rather than face the disease, yet all volunteered to stay. Six eventually died from flu.

Throughout the country the United States Health Department was besieged by calls for more nurses to care for the sick. GEN John J. Pershing, commander of all American troops in Europe sent an urgent appeal for 1,500 more nurses. Philadelphia's trained nurses were not enough; student nurse and lay volunteers were quickly utilized.

The University of Pennsylvania's School of Nursing's 1919 yearbook describes the scene: "Then came the epidemic of influenza, and our plans for service (in the armed forces) were brought to a standstill, for we had all we could manage at home. Ever in our hearts will remain the memory of those classmates, Grace Virginia Fitzgerald and Marie Luise O. Bormann who gave their lives in the influenza epidemic October twelfth and thirteenth 1918."

The frustration of Philadelphia nurses can best be illustrated by the 1919 annual report of the Chestnut Hill Hospital's School of Nursing where a passage reads, "most tragic because of the loss by death of so many nurses and because of our inability to meet the needs of the patients who came to us during the epidemic of influenza that swept the city."

Philadelphia's well-organized Society of Visiting Nurses, "had every thought and previous action blotted from their minds," by the great tragedy. Nurses were busy around the clock caring for the thousands of sick

who could not reach a hospital. They described entering houses where all members of a family were dead. Some had both parents dead and the children starving. In some neighborhoods they were hailed as saviors. In others they were shunned due to the white gowns and gauze masks they wore.

The Philadelphia Automobile Club volunteered and effectively transported the nurses on their rounds. Care of the sick was made even more difficult by the refusal of some people to assist in the care of neighbors and even relatives for fear of contracting the disease. The Society of Visiting Nurses, in its 1918 report claimed the influenza epidemic gave it purpose and resources it never would have had otherwise. Members cared for thousands during the epidemic and some gave their lives.

A growing problem that threatened the living was the dead. Bodies started piling up in makeshift morgues and in the streets. In a vision not seen since the Black Death of medieval Europe, carts went through the streets, their drivers calling for people to bring out the dead for burial. Wagonloads of bodies, some dead over a week, were buried in Potter's Field at Second and Luzerne Streets. Highway workers dug large trenches and filled them to capacity. The promise that bodies could later be retrieved and reinterred after the epidemic subsided persuaded relatives to give up loved ones. Relatives never recovered most of the bodies.

### **Aftermath**

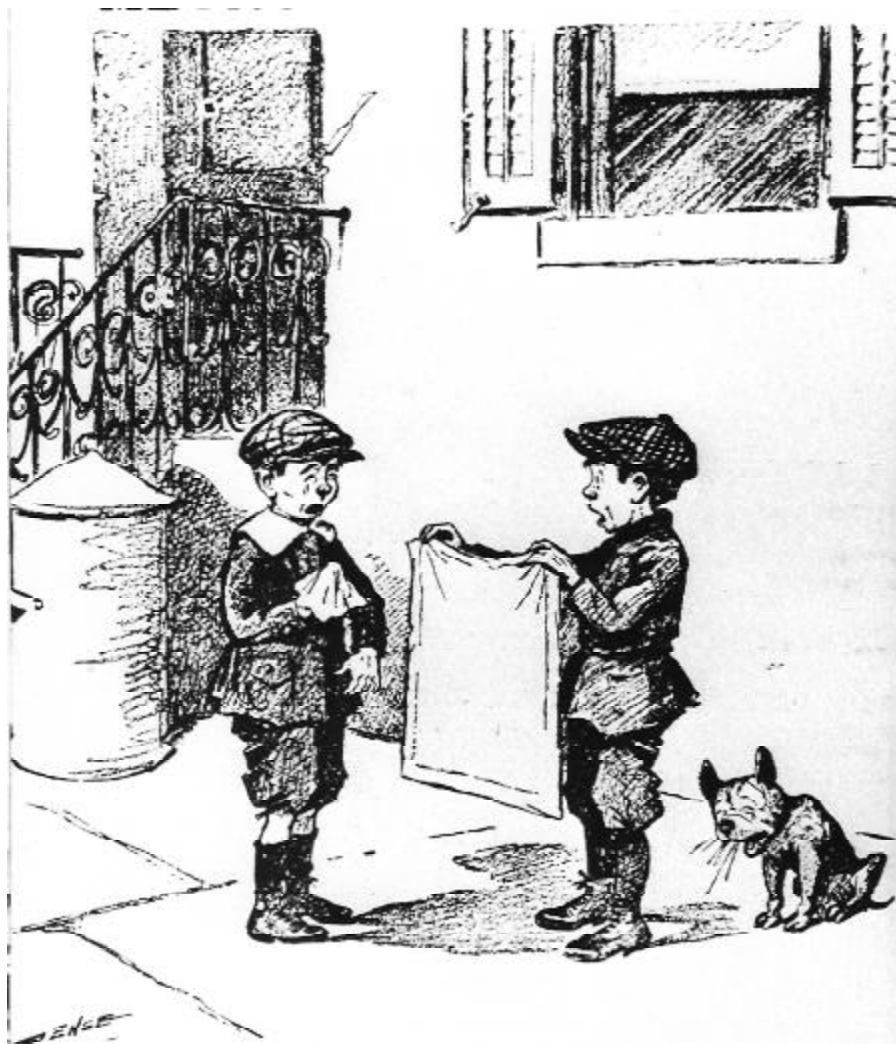
By October 27th the epidemic began to subside as quickly as it came. Other parts of the country would continue to suffer from the pandemic well into the spring of 1919. The passing of influenza through the city left an estimated 12,191 dead. In but 4

weeks, there were 47,094 reported cases.

As soon as the dying stopped the forgetting began. The 1918 influenza pandemic is seldom mentioned, and most Americans have never heard of it. What is amazing is just how quickly the amnesia began. In researching archives, I was shocked at how little appeared in journals, yearbooks, and annual reports during the pandemic or within a year of its passing. And here was a disease that killed more people in less time than any other event in world history. It was as though it had never happened. It certainly is true that the human mind always tries to expunge the intolerable from memory.

Medical science remains haunted by the disappearance of the virus. Where did it come from, and where did it go? Virologists are only now slowly unlocking the secrets of the Spanish Flu from recently discovered lung tissue specimens from 1918. Apparently, the virus' savageness was due to a flu strain that had undergone a mutation. Influenza viruses mutate constantly in what is known as antigenic drift, usually in such minimal ways that last year's flu or vaccine offers at least some protection against this year's outbreak. But about every decade or two, such drift may be so dramatic as to be regarded by the human body as an entirely new virus. Then it sweeps through the human population with a vengeance. In 1957 the Asian flu killed 70,000 Americans. In 1968 the Hong Kong flu killed 28,000.

In a recent report from the Centers for Disease Control and Prevention, epidemiologists believe the probability is high that another dangerous new strain of the influenza virus will emerge. Combined with the world's increased population and jet-age



.. Did ya get that fer yer birthday? Gee! That's some hankachif." ..  
 "Yeh, me mother made it fer me. It's good fer a hundred sneezes."  
 The New York World tried to find some humor in the epidemic.

travel, the stage could be set for another catastrophe. This pandemic could spread so fast that research laboratories could not isolate, prepare, and distribute an appropriate vaccine in time. Jeffery K. Taubenberger of the Armed Forces Institute of Pathology and the primary researcher of the 1918 virus points out that if the records are any indication, another pandemic is inevitable. The question is when.

The Spanish Influenza's legacy is carved in stone, amid the cemeteries

of cities, towns, and villages throughout United States. A walk through any one of them will possibly reveal a mass grave or perhaps a poignant tombstone inscribed with the year of death—1918.

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# The Sleepy Sailor

CDR David A. Bradshaw, MC, USN  
LCDR Asha V. Devereaux, MC, USN

**E**xcessive sleepiness contributes to poor job performance, accidents, and psychosocial dysfunction. Military members are at risk for sleep deprivation due to travel and demanding work schedules, particularly during sustained operations.(1) In addition, sleep disorders are not uncommon in our young, healthy military population. At Naval Medical Center San Diego we perform over 600 sleep studies annually on active duty personnel. Unfortunately, most physicians and other health care providers receive little training in sleep disorders and are unsure how to diagnose or treat patients who complain of sleepiness.(2) The purpose of this paper is to provide an overview that will facilitate the evaluation and treatment of sleepy patients.

## Measuring Sleepiness

The most widely used subjective measure of sleepiness is the Epworth Sleepiness Scale (ESS), see Figure 1.(3) This self-administered questionnaire requires the subject to rate (on a scale of 0-3) the risk of dozing in eight different situations. A total score greater than 10 suggests excessive sleepiness, but does not establish the cause. The Multiple Sleep Latency Test (MSLT), on the other hand, provides an objective measure of sleepiness by calculating the average time to sleep onset in a series of monitored daytime naps.(4) The MSLT is a labor and time intensive procedure reserved for cases where sleepiness must be quantified or when narcolepsy is suspected.

## Sleep Quantity

Adult sleep habits vary considerably. A 1995 Gallup Poll reported that the mean sleep amount of American adults is 7 hours, although 19 percent of respondents reported 5 or fewer hours sleep per night and 4 percent

reported nine or more hours.(5) Many sleep researchers believe that chronically insufficient sleep is prevalent in our society and that the best way to determine an individual's need is simply to allow him/her to awaken in the morning without an alarm clock.(6) Studies have demonstrated that even modest daily sleep loss accumulates and may lead to a significant "sleep debt" and daytime impairment.(7)

Clues to chronically insufficient sleep include; unplanned napping, falling asleep immediately upon going to bed, and a marked discrepancy between hours slept during the work week and on weekends or vacation. Self-reported sleep using a sleep log, as in Figure 2 is very useful in confirming the quantity and patterns of sleep. When sleep deprivation seems likely, we recommend a trial of extended sleep, including removal from night or watchstanding duties, if necessary, prior to further evaluation.

## Sleep Timing

Sleep drive is determined not only by prior sleep, but also by our internal biologic clock. This clock keeps physiologic processes, including sleep, synchronized to our 24-hour day.(8) Attempts to work or sleep "out of phase" result in unpleasant symptoms, poor sleep quality, and sleepiness. Common causes include jet lag and shift work.(9) There are also circadian rhythm disturbances that may result from a "malfunctioning" biologic clock. Patients with delayed sleep phase syndrome (DSPS), for example, can only sleep in the early morning hours and have great difficulty keeping an acceptable work or social schedule.(10)

One of the authors (DB) recently testified at court-martial proceedings for an active duty USMC corporal

Figure 1.

Naval Medical Center San Diego  
Sleep Disorders Clinic

## THE EPWORTH SLEEPINESS SCALE

Name: \_\_\_\_\_  
Age: \_\_\_\_\_  
Sex: M F  
Date: \_\_\_\_\_

How likely are you to doze off or fall asleep in the following situations, in contrast to feeling just tired? This refers to your usual way of life in recent times. Even if you have not done some of these things recently try to work out how they would have affected you. Use the following scale to choose the most appropriate number for each situation:

0= would never doze  
1= slight chance of dozing  
2= moderate chance of dozing  
3= high chance of dozing

Situation	Chance of dozing
Sitting and reading	_____
Watching TV	_____
Sitting, inactive in a public place (e.g. a theatre or a meeting)	_____
As a passenger in a car for an hour without a break	_____
Lying down to rest in the afternoon when the circumstances permit	_____
Sitting and talking to someone	_____
Sitting quietly after a lunch without alcohol	_____
In a car, while stopped for a few minutes in traffic	_____

*Thank you for your cooperation!*

rupts sleep and stresses the cardiovascular system.(13) There is considerable evidence linking obstructive sleep apnea to cardiovascular morbidity/mortality. Patients with obstructive sleep apnea often seek medical attention only after a bedpartner or roommate complains of snoring or becomes alarmed by periods of prolonged breathing pauses. Snoring can be very loud and is characteristically punctuated by periods of silence, followed by a gasp or snort and body movement. Other common symptoms include dry mouth, nocturnal sweating, morning headaches, heartburn, decreased sexual desire, and nocturia. Excessive caffeine intake may mask sleepiness, although most patients are still bothered by unrefreshing sleep and need to nap. Because sleep apnea is known to increase the risk for motor vehicle accidents, a thorough driving history should be obtained.(14)

There are currently no adequate screening questionnaires or physical findings that reliably predict the presence or severity of obstructive sleep apnea in individuals. Obesity is a well-established risk factor for OSA, but is not invariably present. Patients with suspected obstructive sleep

charged with multiple unauthorized absences because of over-sleeping. A diagnosis of DSPS proved instrumental in his defense, similar to a previously published case.(11)

Diagnosis of circadian rhythm disturbances relies primarily on history and a corroborating sleep log. Laboratory sleep studies are generally not needed, although other circadian rhythm markers such as core body temperature or melatonin levels can provide confirmatory evidence. Treatment with appropriately timed bright light exposure is effective in resynchronizing the patient's sleep-wake cycle.(12)

### Obstructive Sleep Apnea

Obstructive sleep apnea (OSA) is a disorder caused by repetitive upper airway narrowing or closure that dis-

rupts sleep and stresses the cardiovascular system.(13) There is considerable evidence linking obstructive sleep apnea to cardiovascular morbidity/mortality. Patients with obstructive sleep apnea often seek medical attention only after a bedpartner or roommate complains of snoring or becomes alarmed by periods of prolonged breathing pauses. Snoring can be very loud and is characteristically punctuated by periods of silence, followed by a gasp or snort and body movement. Other common symptoms include dry mouth, nocturnal sweating, morning headaches, heartburn, decreased sexual desire, and nocturia. Excessive caffeine intake may mask sleepiness, although most patients are still bothered by unrefreshing sleep and need to nap. Because sleep apnea is known to increase the risk for motor vehicle accidents, a thorough driving history should be obtained.(14)

There are currently no adequate screening questionnaires or physical findings that reliably predict the presence or severity of obstructive sleep apnea in individuals. Obesity is a well-established risk factor for OSA, but is not invariably present. Patients with suspected obstructive sleep apnea should be referred for an overnight sleep study known as a "polysomnogram."(15) This test monitors parameters essential to sleep staging (EEG activity, eye movements, and muscle tone), leg movements, EKG, and respiratory function. Polysomnography is generally performed in a hospital or clinic-based sleep laboratory under direct observation, although home-based testing is gaining popularity.(16) Streamlined studies that monitor only cardiopulmonary status during sleep may be adequate to establish a diagnosis of moderate or severe OSA, but oximetry alone is not acceptable.(17)



A stepwise surgical approach begins with correction of specific tissue structures identified as sites of obstruc-

A follow-up sleep study is mandatory following surgery or oral appliance use to document efficacy. Nasal CPAP is the first-line treatment for most patients with obstructive sleep apnea.<sup>(24)</sup> Positive air pressure applied through a nasal mask splints the otherwise collapsible upper airway and eliminates snoring, airway closure and oxygen desaturation. Nasal CPAP must be titrated, generally under direct observation in the sleep lab, to establish an effective pressure. Current CPAP units are portable (3.5–5 lbs.), quiet, and preferred by bedpartners/roommates to disruptive snoring. Over the past 2 years we have prescribed nasal CPAP for over 130 active duty patients. A recent survey found that 84 percent of these patients were satisfied with CPAP and 30 percent had

**Figure 2.**

successfully used CPAP aboard ship, although slight modification of the berthing space may be necessary. Obviously, nasal CPAP would not be appropriate in a field environment.

### Periodic Limb Movement Disorder

Periodic limb movements of sleep (PLMS) are rhythmic contractions of the legs that may fragment sleep and cause daytime sleepiness.(25) These movements are often subtle, resemble the pathologic “Babinski” response, and occur at 20- to 90-second intervals. Some afflicted patients experience frequent awakenings and complain of insomnia. Restless legs syndrome (RLS) is a distinct, albeit related disorder, characterized by a disagreeable sensation in the legs (usually calves), mainly at night, that is relieved by movement or walking. Most patients with RLS also have periodic limb movements during sleep. Iron deficiency, uremia, pregnancy, advanced age, and a positive family history may be risk factors for RLS and/or PLMS. Both disorders appear to respond best to dopaminergic medications.(26)

### Narcolepsy

Narcolepsy is a relatively uncommon disease (prevalence 0.09 percent) characterized by disturbed nocturnal sleep and bouts of severe daytime sleepiness. Narcolepsy may be best understood as a disorder where elements of REM sleep (i.e., dreaming and muscle paralysis) intrude into wakefulness. The classic symptom tetrad includes (1) excessive daytime sleepiness, (2) cataplexy, (3) hypnagogic hallucinations, and (4) sleep paralysis.(27) Of the four, cataplexy is the most specific symptom and varies from subtle neck or extremity weakness to transient paralysis and collapse brought on by intense emotional stimuli, especially laughter.(28) Sleep paralysis (awakening from sleep with transient paralysis) and hypnagogic hallucinations (dreams during the transition from wake to sleep) are less specific for narcolepsy and may occur in normal individuals.(29)

The diagnosis of narcolepsy is based on history and confirmation of objective sleepiness and sleep onset-REM periods during a MSLT.(30) The treatment of narcolepsy includes good sleep hygiene, appropriately timed naps, and central nervous system stimulants to ameliorate daytime sleepiness. Cataplexy and other associated symptoms usually respond to antidepressant medications.

### Miscellaneous

Other causes of excessive daytime sleepiness include post-traumatic hypersomnolence, Kleine-Levin syndrome, and idiopathic hypersomnolence. Excessive sleepiness following brain injury is a fairly common com-

plaint and warrants the same evaluation as in other patients.(31) Kleine-Levin syndrome or periodic hypersomnia is a very rare disorder reported mainly in young men and characterized by cyclic episodes of severe sleepiness, binge eating, and hypersexuality.(32) Idiopathic hypersomnolence is a diagnosis of exclusion when objective sleepiness (based on MSLT findings) is present without other explanation.(33)

### Summary of Approach to Excessive Sleepiness

1. A thorough history and focused physical examination should be performed on patients who present with complaints of excessive sleepiness. A sleep log should be given in advance, if possible, and reviewed at the initial evaluation. Patients suspected of insufficient sleep should be given a trial of extended sleep before further evaluation. The sleep log also provides important clues to disorders of sleep timing (circadian rhythm disturbances) that warrant referral to a sleep specialist.

2. Clinical suspicion for obstructive sleep apnea mandates an overnight sleep study. Patients diagnosed with obstructive sleep apnea and treated with nasal CPAP need close clinical follow-up to insure resolution of symptoms. Once symptoms are controlled, followup every 6-12 months is usually sufficient. Patients treated with surgery or an oral appliance need a repeat sleep study to document efficacy.

3. Patients found to have frequent periodic limb movements of sleep, and no other explanation for excessive sleepiness, may be given a therapeutic trial of pharmacological treatment.

4. Symptoms suggestive of narcolepsy (cataplexy, hypnagogic hallucinations, sleep paralysis) mandate referral to a sleep laboratory for polysomnography and multiple sleep latency testing (MSLT).

5. Patients with a normal polysomnogram and no evidence of sleep deprivation or a circadian rhythm disturbance should undergo multiple sleep latency testing to document sleepiness. In the absence of an alternative diagnosis, patients with severe objective sleepiness are diagnosed with idiopathic hypersomnolence and may warrant treatment with central nervous system stimulants.

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## In Memoriam

CDR Ernest J. Irvin, MSC, (Ret.), died on 29 January 2001 in Stuart, FL. He was 81.

CDR Irvin was born in Ged, LA. He joined the Navy in 1937. Following boot camp in Norfolk, VA, he went to Hospital Corps school in San Diego. Upon graduation, he was assigned to the Fleet Marine Force, 6th Regiment. "I hadn't been anywhere yet," he recalled. "You would go home and the kids all would ask, 'Hey, where have you been?' 'I'd say, 'I've been in San Diego.' 'Oh, what the hell; you're no sailor.'" And so, without further thought, Irvin volunteered for the Asiatic Station and sailed for the Far East aboard the troop transport USS *Henderson* (AP-1) in late 1939.

After a short stay at the Naval Hospital Cañacao near Manila, Irvin shipped aboard the destroyer tender, USS *Black Hawk* (AD-9), a vessel he recalled had "the worst reputation in the Navy at that time." He and his shipmates traveled up and down the Chinese coast with the Asiatic Fleet at a time when the Japanese occupied many of China's ports. Witnessing cruelty to the Chinese firsthand, Irvin would himself become a victim of the Japanese.

He was with the *Black Hawk* for 14 months before being assigned to Naval Hospital Cañacao as a ward corpsman. In October 1941 Irvin went to "C" Battery, a Marine anti-aircraft outfit near the village of Binakayan as the battery's corpsman.

When war came to the Philippines on 8 December 1941, Irvin and "C" Battery redeployed in a rice paddy near Mariveles on the Bataan Peninsula. Their job was to bring down Japanese aircraft with their World War I vintage guns "salvaged from the scrap heap at the Navy Yard and mounted on makeshift metal bases."



When Bataan fell on 9 April 1942, Irvin escaped to the island fortress of Corregidor in Manila Bay and joined its defenders. "We were fanned out like a deck of cards to fill gaps in the rapidly depleting lines of beach defense."

Six days before Corregidor fell, he was pulled off beach defense to work in the Malinta Tunnel hospital where he worked on the convalescent ward. "We all knew it was a matter of time. We thought the Japs would either gas us in the tunnel or march us out and shoot us."

They did neither. Two months after the most humiliating surrender in U.S. military history, PhM2c Irvin and his surviving comrades were taken by small boats to a Manila pier and made to walk the rest of the way to the infamous Bilibid Prison, a hovel condemned by Philippine civil authorities even before the war began. With other medical personnel captured by the Japanese, Irvin helped staff the Bilibid Prison hospital, trying desperately to keep his fellow prisoners alive.

That, too, seemed a losing cause. Bilibid's doctors and hospital corpsmen encountered every malady in a

tropical medicine textbook plus deficiency diseases that soon took a heavy toll. A growing forest of wooden crosses beside one of Bilibid's forbidding walls testified to Japanese neglect and brutality.

When the Japanese needed prisoners for the large farm camp of Cabanatuan, Irvin volunteered. "The only good part was that you were out in the fresh air. They had to teach us how to farm, how to pull weeds. You pull the weeds with your right hand and put them in your left. The instructions were all in Japanese, of course. But to do this you couldn't stoop, you couldn't squat, you couldn't sit or kneel."

In February 1944, Irvin and about 200 other prisoners boarded a ship for Japan to augment a dwindling labor supply. Imprisoned in the unventilated hold, they remained at sea until March. A few days out of the port of Moji, an American submarine hit the convoy. Irvin was on deck at the time and saw a stricken cruiser go down stern first. He and his comrades were lucky. Later that year more and more of these so-called "hell ships," laden with Allied prisoners, succumbed to the friendly fire of U.S. planes and submarines.

Irvin ended up in yet another prisoner of war camp in Osaka and put to work in a shipyard. Many of the camp's inmates were POWs from Wake Island, and Dutch prisoners from Java. Work was hard and food scarce. The prison hospital was stuffed beneath the bleachers of a sports stadium. Shortly thereafter, he was transferred to a camp in nearby Kobe.

The first week of June 1945, U.S. B-29s bombed Kobe into ashes. Sadly, the bombs did not distinguish friend from foe. "I was just looking out the window when suddenly the



ground sort of shook. Someone shouted 'fire.' A British guy named Sydney Chapman came running through the ward with his backside on fire. He was like a wild animal. I tackled and held him down until the fire was out. I got burns on my face and hands but probably saved his life." Three prisoners were killed by direct hits and 20 were so badly burned that they died later.

Damage to the camp was so severe that the inmates had to be evacuated. All they had were strips of clothing and rags for bandages. Flies laid their eggs between those rags and as the maggots hatched, they feasted on necrotic tissue, sometimes nibbling on live tissue and nerve endings.

Following the camp's destruction, life grew even harder. Guards took out their frustration and anger on the prisoners. "The Japs punished our guys for the least little thing. Their policy was that if you didn't work and contribute to their effort you didn't deserve to eat." If food had grown scarce for the Japanese, the POWs got what ever precious little remained. "I don't remember getting any rice at all in Japan. We got barley mixed with millet, which was very much like chicken feed." Needless to say, stray animals unlucky enough to enter the camp never made it out.

About 2 days after the Japanese signaled their intention to surrender, Dr. Ohashi, the physician nominally in charge of the camp, assembled those POWs who still could walk to tell them it was over. "He said: De Wah is now ovah! There are three reasons. The Emperor has ordered everyone to cease fighting.' We chuckled at that. 'The Americans have invented some kind of atomic bomb. And number three. We have no more navy.' We roared when we heard that. They stacked their rifles

and we were then free to come and go as we pleased."

Irvin and those lucky enough to have survived captivity were liberated by American troops on 9 September 1945, a week after the formal surrender ending World War II took place on the battleship *Missouri*. He had been a prisoner of war over 40 months.

The homecoming was anticlimactic. "There were no parades. By then the novelty was over. We just blended in with everybody. We'd go to a restaurant and hear people complain that they hadn't had any butter or sugar. We'd tell them, 'You should have been where we were,' or we'd simply walk out."

Pharmacist's mate Irvin served in every enlisted pay grade of the Hospital Corps before receiving his commission as an ensign in the Medical Service Corps in 1952. He received a bachelor of science degree from the Statler School of Hotel and Restaurant Administration at Cornell University, and studied at the School of Public Health, University of Califor-

nia, Berkeley. He served as a food service officer at naval hospitals in Japan, California, and South Carolina, retiring as a commander in 1977 after serving nearly 39 years in the Navy. His last assignment was on the staff of the Surgeon General at the Bureau of Medicine and Surgery.

CDR Irvin held the Silver Star, Bronze Star, Army Distinguished Unit Badge, Good Conduct Medal, National Defense Service Medal with one star, Philippine Defense Medal, World War II Victory Medal, Purple Heart, POW Medal, Joint Service Commendation Medal with one star, Navy Commendation Medal, Vietnam Service Medal, and Armed Forces Expeditionary Medal.

Throughout the last years of his life CDR Irvin was an active member of several veteran's organizations including the American Defenders of Bataan and Corregidor. He was also a champion of POW causes, working tirelessly for better care for those men whose health had been broken by their World War II captivity. He espoused the belief that Japanese atonement for the crimes committed during that war could only be achieved when the current government in Tokyo apologized and compensated POWs forced to work as slave laborers.

"Doc Ernie," as he was known to many of us in the Medical Department, was the quintessential hospital corpsmen of the "Old Navy," and a constant inspiration. What was tropical duty at Cañacao before the war? What was a first class pharmacist's mate paid in 1941? I relied on him to answer these and countless other questions, and he always came through. Ernie Irvin painted my picture of the hospital corpsmen's life back then. He was a patron of Navy medicine and a dear friend. We will miss him very much.—JKH



Naval Training Center, Norfolk, VA. 1938

## Book Review

*Chemical Warfare Medicine: Aspects and Perspectives from the Persian Gulf War*. Edited by Professor Yehuda L. Danon and Dr. Joshua Shemer. Gefen Publishing House, Ltd., Jerusalem. 227 pages, 1994

The cover of *Chemical Warfare Medicine* contains an interesting photo, one that you would not necessarily expect to see on a book dedicated to a subject on modern warfare. The picture is of a very elderly civilian woman draped in a shawl and wearing heavy sweaters, and carrying—of all things—a gas mask! When one pauses to consider this picture, at first blush it seems strangely inconsistent with the topic at hand. On further reflection, however, it is readily apparent that the authors are making a very pointed statement, one that becomes lucidly clear after reading this very timely and useful collection of edited articles on medical issues related to the threat of chemical weapons.

During the Persian Gulf War, Professor Yehuda Danon (a reserve brigadier general) and Dr. Joshua Shemer (a reserve colonel) served, respectively, as the Chief and the Deputy Chief of the Israeli Medical Corps. For more than 20 years prior to the outbreak of the Gulf War, Drs. Danon and Shemer had been actively involved in research on the effects of chemical weapons, and the development of medical defensive measures to counter or mitigate that threat. Given their expertise and research interests in the chemical warfare arena, and the subsequent threat of chemical weapons brought home by the Iraqi attacks on Israeli population centers, the editors were extremely well-prepared to edit the series of informative articles contained in this book.

Either the Iraqis were unsuccessful in their attempts to launch chemical agents against the Israelis, or clearly understood the ramifications of such an attack. Nevertheless, the fact remains that there were no instances of weaponized chemical munitions reaching Israeli soil. Regardless of this fact, Israeli citizens were forced to assume a high level protective posture to help minimize the effects of chemical agents had they actually been successfully delivered against a civilian population.

Being forced to this unprecedented level of protection afforded the Israeli military, medical, and emergency response personnel a unique tripartite perspective to assess their overall protective measures, the physiological repercussions of the threat, and the intense psychological impact the looming menace of chemical weapons exposure posed on large population concentrations.

The collection of articles contained in *Chemical Warfare Medicine* is subsequently divided into these three distinct areas. The initial series of articles examines physiological events associated with the chemical warfare threat, including a review of non-CW-related morbidity and mortality during peak threat periods, the effects of pre-treatment agents, and the utility of personal protective equipment (PPE) and devices available for use during chemical attacks.

The second series of articles focuses on aspects of contingency response, reviewing established mass casualty procedures and assessing the adequacy of response measures during the Persian Gulf War.

The final series of articles are perhaps the most interesting of the edited collection contained in *Chemical Warfare Medicine*, for they focus on the psychological impact of the threat. Discussions on anxiety reactions, Post-traumatic Stress Disorder (PTSD), and therapeutic measures to cope effectively with facing a WMD threat underscore the importance of addressing mental health issues related to asymmetrical warfare threats.

The threat of exposure to chemical weapons of mass destruction is no longer limited to the battlefield. As events like the Aum Shinrikyo sarin attack in a Japanese subway have proven, civilian populations are now in as much of an “at-risk” category as the uniformed soldier. In the future, pictures of elderly matrons as potential victims of chemical agent attacks may no longer appear as incongruous as they once did. The Israeli experience during the Persian Gulf War stands as testimony to this fact, hence the merit of a thorough review of *Chemical Warfare Medicine*.

Drs. Danon’s and Shemer’s book presents very timely and useful experiential data for those in the healthcare contingency response community. There is much to be learned about how that community can come to grips with the requirements of crisis mitigation and consequence management in the CW environment. This book is recommended reading. □

—LCDR Pietro D. Marghella, MSC, USN, Chief, Medical Plans and Intelligence, Office of the Surgeon, USCINCPAC.

## Navy Medicine 1943



BUMED Archives

Hospital corpsmen learn proper bandaging technique at the U.S. Naval Training Station, Farragut, ID.